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THE SYSTEMATIC STATUS OF THE  
LINED SNAKE OF IOWA<sup>1</sup>

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In the recent review of the systematics and biogeographic significance of *Tropidoclonion lineatum* (Hallowell) in Illinois (Smith and Smith, 1962), we overlooked the description by R. Ellsworth Call (1891) of *Tropidoclonium lineatum iowae* from Story and Polk counties, Iowa. Although we plotted a Story County record on our distribution map, we did not allocate the specimens on which the record was based to subspecies, and indeed we were then not even aware that the record represented the type-locality of *iowae*.

Shortly after the appearance of our paper, Kraig K. Adler called our attention to the generally overlooked description by Call and to the availability of specimens from additional Iowa localities. The new material enables us to allocate Call's name *iowae*, but at the same time it raises doubt that the Iowa distribution of the lined snake is relictual, as we had presumed, and it requires reexamination of the data and interpretations presented in our 1962 paper.

*Acknowledgments:* We are grateful to Kraig K. Adler of the University of Michigan for calling our attention to the Iowa situation and the location of some of the syntypes, and to him and to Dr. Kenneth D. Carlander of Iowa State University for the loan of specimens and other courtesies. We are indebted to Joseph T. Collins and Corson Hirschfeld of the Ohio Valley Herpetological Laboratory for information on a syntype of *T. l. iowae* and to Dr. Jack L. Gottschang of the University of Cincinnati for generously donating the type to the University of Illinois Museum of Natural History. We acknowledge information received from Roger Conant, Philadelphia Zoological Garden, and from Charles W. Myers and Dr. William E. Duellman, University of Kansas Museum of

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Natural History, regarding the Missouri range of the species, made available through the researches of the late Paul Anderson of Independence. We thank Dr. Doris M. Cochran for checking the identification of an old Yarrow specimen in the U. S. National Museum.

*History of Tropidoclonium lineatum Iowae*: The name *T. l. Iowae* was proposed by Call (1891: 298-9) on the basis of four syntypes, two from Ames, Story Co., and two from Des Moines, Polk Co., Iowa. Two of the specimens were stated (p. 299) to be in the "Iowa Agricultural College, at Ames, Iowa; one in the collection of the Indiana University, Bloomington, and one in the West High School, Des Moines, Iowa." The only specimen of *Tropidoclonium* in the Iowa State University Museum collected before 1922 is a badly faded example bearing the notation "B. F. Osborne collection." The specimen, No. 403, is in excellent condition except for depigmentation. Collectors were not recorded in Call's account, and we can find no information on the history of an Osborne collection, although the name of Herbert Osborn is well known in the Iowa zoological literature. There is a reasonable possibility that the specimen in question was one of the syntypes of *iowae*; it is certainly the only specimen there that could logically be regarded as a syntype.

During the course of our investigation, Mr. Joseph T. Collins wrote us that he and Mr. Corson Hirschfeld had discovered the syntype that Call originally deposited at Indiana University among specimens donated to the University of Cincinnati by the Cincinnati Museum of Natural History. Dr. Jack L. Gottschang of the University of Cincinnati generously presented the specimen, now UIMNH 53022, to us.

This syntype is clearly the last of the four for which characteristics are tabulated on page 299 of Call's paper; that specimen had 35 caudals as does UIMNH 53022, whereas the other syntypes had 31, 29, and 18. (All four apparently had incomplete tails.) Call's fourth specimen had 145 ventrals, whereas our count (from the first ventral of full width) for No. 53022 is 141; however, if all the scales are counted back of the posterior chinshields, the count comes to exactly 145. Assuming that Call was consistent in his method of scale counting, we have adjusted all the ventral counts for specimens in his table by subtracting four from the figures given, to make the counts comparable to ours. This adjustment gives figures that agree well with our counts on specimens from central Iowa, whereas the unadjusted counts would be higher than expected. The total length and tail length recorded by Call are, respectively, 15 and 3 mm greater than our measurements of No. 53022, but this degree of shrinkage in over 60 years of preservation is to be expected. Except for fading, the specimen is in excellent condition.

Accordingly, we hereby designate UIMNH 53022 lectotype (more exactly, the lectoholotype, the other specimens listed becoming, in effect, lectoparatypes) of *Tropidoclonium lineatum Iowae* Call, 1891. The type-locality is thus restricted to Des Moines, Polk Co., Iowa, the locality data borne by No. 53022.

*Iowa specimens examined:* Adams Co.—3 mi W Corning, Iowa State Univ. 485 (3 specs.); Cherokee Co.—Cherokee, Iowa State Univ. 2816; Keokuk Co.—5½ mi W Sigourney, Iowa State Univ. 401; Lee Co.—6 mi NE Ft. Madison, Iowa State Univ. 179; Lucas Co.—near Chariton, Univ. Michigan Mus. Zool. 94200; 1½ mi E Chariton, Iowa State Univ. 402; Montgomery Co.—2.6 mi N Morton Mills, Iowa State Univ. 404; Polk Co.—Des Moines, Univ. Illinois Mus. Nat. Hist. 53022 (lectotype; collected by R. E. Call in 1888), Univ. Michigan Mus. Zool. 92970 (2 specs.) and 92971; Scott Co.—Davenport, Univ. Illinois Mus. Nat. Hist. 50885–6; Story Co.—Ames, Iowa State Univ. 403; Wapello Co.—N of Ottumwa, Univ. Michigan Mus. Zool. 92972.

*Subspecific status of Tropidoclonium lineatum iowae:* Stejneger (1891: 504) synonymized *iowae* almost immediately after its proposal and commented that he was unable to find any characters that would separate it from Hallowell's type (*lineatum*) or from Missouri specimens (now assigned to the subspecies *annectens*). Inasmuch as the currently recognized subspecies *annectens* and *texanum* were described much later (Ramsey, 1953), subspecific allocation of the generally overlooked name *iowae* becomes of pressing taxonomic importance.

Including data that Call gave for four syntypes (with the ventral counts adjusted, as described in a preceding paragraph), ventral counts are available for six females and one male from Story and Polk counties; of these, caudal, and ventral plus caudal, counts are available for three females (three other females and the male lectotype have incomplete tails). Ventrals are 135–144 (mean 140) in females and 141 in the male and suggest the subspecies *lineatum* or *texanum* but not *annectens* or the Illinois population (Table 1). Caudals are 32–35 (mean 33.3) in the three females and inconclusive; the mean, although slightly closer to that of the Illinois relict population, could as easily have occurred in a sample of *lineatum* or *annectens* (Table 1) but not of *texanum*. Ventrals plus caudals range from 167–176 (mean 171.6) in females and are closest to the counts of *texanum*, next closest to *lineatum*. The similarity of the means (except caudals) for samples of topotypic *iowae* and the geographically remote *texanum* is undoubtedly fortuitous. All seven specimens from Story and Polk counties have 17–19 scale rows, the formula modal for *lineatum*. Accordingly, the central Iowa population can be referred to the nominate subspecies.

*Subspecific status of specimens from other areas in Iowa:* The 10 Iowa localities from which specimens are now available happen to be aligned so that it is convenient to divide them into four samples. From west to east, these samples consist of (1) two females and three males (in Table 1, "Western Iowa") from Adams, Montgomery, and Cherokee counties, all assignable to *lineatum*; (2) five females and one male plus counts for two other specimens given by Call (in Table 1, "Central Iowa"), from Story, Polk, and Lucas counties, all closer to *lineatum* than to *annectens* or the Illinois relict; (3) two females (in Table 1, also included in "Cen-

TABLE 1.—Three principal characters for three Iowa samples of female *Tropidoclonion lineatum*, showing relationships to *T. l. lineatum*, to the Illinois relict population, and to *T. l. annectens*<sup>1</sup>

POPULATION	NO. OF SPECIMENS	VENTRALS	CAUDALS	VENTRALS PLUS CAUDALS
<i>T. l. lineatum</i>	35	141.2 $\pm$ 0.46 (135–148)	34.6 $\pm$ 0.42 (31–40)	175.5 $\pm$ 0.66 (169–184)
Western Iowa <sup>2</sup>	2	141.5 (138–145)	34.0 (33–35)	175.5 (171–180)
Central Iowa <sup>3</sup>	10	140.9 $\pm$ 1.0 (135–147)	33.4 $\pm$ 0.45 (32–35)	172.0 $\pm$ 1.1 (167–175)
Eastern Iowa	3	144.3 (141–148)	33.0 (32–34)	175.5 (173–178)
Illinois Relict <sup>4</sup>	25	144.8 $\pm$ 0.62 (138–150)	33.0 $\pm$ 0.50 (26–38)	177.9 $\pm$ 0.79 (170–184)
<i>T. l. annectens</i>	118	147.0 $\pm$ 0.23 (142–156)	34.3 $\pm$ 0.17 (24–39)	181.8 $\pm$ 0.29 (168–189)

<sup>1</sup> For each character the scale count range, enclosed in parentheses, is immediately beneath the mean and one standard error.

<sup>2</sup> The sample from this area also contains three males, not entered in this table, all with typical *lineatum* scale counts.

<sup>3</sup> Includes Keokuk, Lucas, and Wapello as well as Story and Polk counties, but does not include the lectotype, which is a male with an incomplete tail.

<sup>4</sup> Although means for ventrals and ventrals plus caudals for Illinois relict females are intermediate between those of *lineatum* and *annectens*, the corresponding means for Illinois males are almost identical with those of *annectens*.

tral Iowa”) from Keokuk and Wapello counties, not definitely assignable but suggesting *lineatum*; and (4) three females (in Table 1, “Eastern Iowa”) from Lee and Scott counties, assignable to *lineatum* in ventrals plus caudals but decidedly closer to the Illinois population in ventral and caudal counts. Accordingly, all Iowa populations, except those bordering the Mississippi River (Lee and Scott counties) are provisionally referred to the nominate race; the two easternmost populations, to *lineatum*  $\times$  *annectens* intergrades. The availability of larger series, particularly from eastern Iowa, may require revision of present assignments.

*Relictual versus continuous range of Tropidoclonion:* In our 1962 paper, we assumed that all known colonies of *Tropidoclonion* in Iowa, Missouri, and Illinois are relicts, derived from Great Plains populations that occurred farther north and east during the postglacial Hypsithermal interval. Our contention is strengthened by distributional data provided by Anderson’s work in Missouri where, as in Illinois, there is little doubt that present populations are scattered remnants. It would appear to be weakened by the data now available for Iowa, where the 10 known lo-



calities are seemingly distributed evenly across the southern half of the state from the Missouri River to the Mississippi River.

In a sense, the entire range of the lined snake is relictual, occurring as the species does in urban and suburban vacant lots. However, in Kansas, Oklahoma, and central Texas, *Tropidoclonion* is generally common, widely distributed, and predictable. In Illinois and Missouri, it is locally common, sparsely distributed, and distinctly unpredictable. In Iowa, where habitats with ecological characteristics approaching those of the Great Plains are more widely distributed than in Illinois or Missouri, the range of the species may be at a level intermediate between relictual and continuous.

All known records for Iowa, Illinois, and Missouri are plotted in Figure 1, and their probable subspecific identities indicated by hatching. Whether the Iowa range is considered continuous or disjunct, the distributional and variational data afforded by populations in Illinois and Missouri are best explained by assuming a more northern and eastern distribution sometime between the last glacial advance and the present time, as we postulated in our 1962 paper.

Two other outlier records for the species deserve comment. Yarrow (1882: 13) cited a specimen from Hughes, Ohio, a record that could be readily explained by our interpretation since Ohio is within the Prairie Peninsula. Stejneger (1891: 504) pointed out that the specimen in question is in reality a misidentified *Storeria occipitomaculata*; Conant (1938: 8) reidentified the same specimen as *Tropidoclonion* and more recently Dr. Doris M. Cochran, at our request, confirmed Conant's identification. We are in accord with Conant (*ibid.*) that the specimen probably has incorrect locality data but, should additional Ohio specimens be found, Yarrow's record could be validated.

Dellinger and Black (1938: 34) cited a specimen from Imboden, Arkansas. Dowling (1957: 23) dismissed the record as erroneous, but Wright and Wright (1957: 881) published two photographs of the specimen allegedly from Imboden. The Arkansas record is certainly not acceptable on face value, for the collector, B. C. Marshall, was a dealer who received specimens from many parts of the country and demonstrably did confuse locality data on some of the material he sent to museums.

**Conclusions:** (1) *Tropidoclonium lineatum iowae* Call is a synonym of *Tropidoclonion l. lineatum* (Hallowell) and is nomenclaturally fixed by the presently designated lectotype, Univ. Illinois Mus. Nat. Hist. No. 53022, and the herewith-restricted type-locality of Des Moines, Polk Co., Iowa. (2) The range of *T. lineatum* is perhaps incipiently relictual in Iowa, certainly more nearly continuous there than in Missouri or Illinois, and distinctly relictual in Missouri and Illinois. (3) All Iowa populations, except those near the Mississippi River, are referable to *T. l. lineatum*, whereas those bordering the Mississippi River are best regarded as intergrades of *T. l. lineatum* and *T. l. annectens*. (4) The Missouri and Illinois populations, although somewhat atypical, are most intimately re-

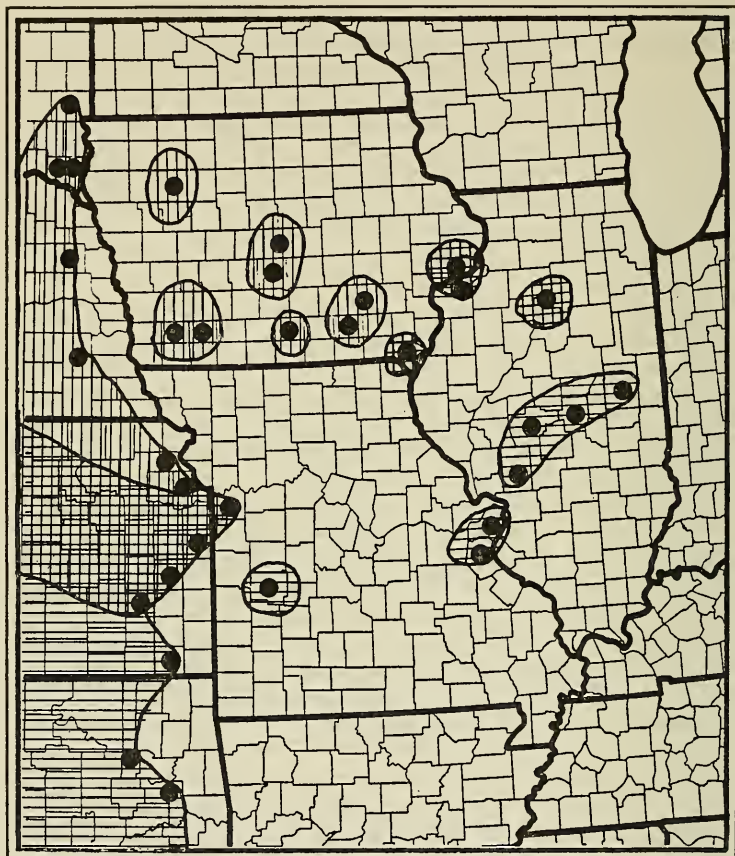


FIG. 1. Distribution of *Tropidoclonion lineatum* in the Prairie Peninsula area. Vertical hatching indicates range of the subspecies *lineatum*; horizontal, the subspecies *annectens*; crosshatching, the areas of intergradation. All known records for Iowa, Missouri, and Illinois but only marginal records for Oklahoma, Kansas, Nebraska, and South Dakota are plotted.

lated to *T. l. annectens*, and the most plausible explanation for the distributional and variational data they provide is that *Tropidoclonion* had a somewhat more northern and eastern distribution, probably during the Hypsithermal interval, than it does at present, as we have postulated elsewhere (Smith and Smith, 1962).

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